jc891 U.S. PTO
10/24/00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
REQUEST FOR FILING NATIONAL PATENT APPLICATION
Under 35 USC 111(a) and Rule 53(b)

PATENT APPLICATION

Hon. Commissioner of Patents
Washington, D.C. 20231

WITH SIGNED DECLARATION

NONPROVISIONAL
NON REISSUE
NON PCT NAT PHASE

jc860 U.S. PTO
09/694345
10/24/00

Sir:

Herewith is the PATENT APPLICATION of
Inventor(s): MIZUTANI, Akihiko

Title METHOD OF MANUFACTURING SPARK PLUG WITH NOBLE METAL CHIP FOR INTERNAL COMBUSTION ENGINE

Atty. Dkt.: PM 274421 (M#) | 54586-US-HH (Client Ref)

including:

Date: October 24, 2000

1. Specification: 15 pages (only spec. and claims) 2. ☐ Specification in non-English language
3. Declaration ☒ Original ☐ Facsimile/Copy ☒ Abstract 1 page(s); 4 numbered claims
4. ☒ Drawings: 3 sheet(s) ☐ informal; ☒ formal of size: ☒ A4 ☐ 11"
5. ☐ See top first page re prior Provisional, National or International application(s). ("X" box only if info is there and do not complete corresponding item 5 or 6). (Prior M# _____ SN _____)
6. **AMEND the specification** please by inserting before the first line: -- This is a ☐ Continuation-in-Part ☐ Divisional ☐ Continuation ☐ Substitute Application (MPEP 201.09) of:
6(a) ☐ National Appln. No. _____/_____ filed _____. (M# _____)
6(b) ☐ International Appln. No. _____ filed _____
_____ .--
7. ☐ **AMEND the specification** by inserting before the first line: -- This application claims the benefit of U.S. Provisional Application No. 60/ _____ , filed _____ . --
8. ☒ Attached is an assignment and cover sheet. Please return the recorded assignment to the undersigned.
9. ☐ Prior application is assigned to _____
_____
by Assignment recorded _____ Reel _____ Frame _____
10. **FOREIGN** priority is claimed under 35 USC 119(a)-(d)/365(b) based on filing in JAPAN (country)
11.

Application No.	Filing Date	Application No.	Filing Date
(1) 11-307490	October 28, 1999	(2)	
(3)		(4)	
(5)		(6)	
(7)		(8)	
(9)		☐ See 3rd page for additional priorties	

12. 1 (No.) Certified copy (copies): ☒ attached; ☐ previously filed (date) _____
in U.S. Application No. _____/_____ filed on _____
13. Small entity status ⌀ ☐ is **not** claimed; ☐ is claimed (**Pre**-filing confirmation required)
13(a). ☐ Attached: _____ (No.) Small Entity Statement(s) (since 9/8/00 small entity statement(s) not essential to make claim)

14. **DOMESTIC/INTERNATIONAL** priority is claimed under 35 USC 119(e)/120/365(c) based on the following provisional, nonprovisional and/or PCT international application(s):

Application No.	Filing Date	Application No.	Filing Date
(1)		(4)	
(2)		(5)	
(3)		(6)	

15. ☐ This application is being filed under Rule 53(b)(2) since an inventor is named in the enclosed Declaration who was not named in the prior application.

16. ☒ Attached: Form PTO-1449 listing the enclosed documents

17. ☐ Preliminary Amendment:

THE FOLLOWING FILING FEE IS BASED ON CLAIMS AS FILED LESS ANY ABOVE CANCELLED

				Large/Small Entity		Fee Code
18. Basic Filing Fee				$710/$355	$710	101/201
19. Total Effective Claims	4	minus 20 =	*0	x $18/$9 =	+ 0	103/203
20. Independent Claims	1	minus 3 =	*0	x $80/$40 =	+ 0	102/202
*If answer is zero or less, enter "0"						
21. If any proper multiple dependent claim (ignore improper) is present , add (Leave this line blank if this is a reissue application)				+ $270/$135	+ 0	104/204
22. TOTAL FILING FEE ENCLOSED =					$710	
23. If "non-English" box 2 is X'd, add Rule 17(k) processing fee				+ $130	+ 0	139
24. If "assignment" box 8 is X'd, add recording fee				+ $40	+ 40	581
25. ☐ Attached is a Petition/Fee under Rule No.				+ $130	+ 0	122
26. TOTAL FEE ENCLOSED =					$750	

Our Deposit Account No. 03-3975

Our Order No. 30954 (C#) | 274421 (M#)

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.

This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed.

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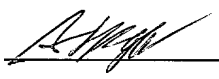
By Atty: G. Lloyd Knight **Reg. No.** 17698

Sig: 

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NOTE: **File in duplicate with 2 post card receipts (PAT-103) & attachments**

APPLICATION UNDER UNITED STATES PATENT LAWS

Atty. Dkt. No. PM 274421/54586-US-HH
(M#)

Invention: METHOD OF MANUFACTURING SPARK PLUG WITH NOBLE METAL CHIP FOR INTERNAL COMBUSTION ENGINE

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This is a:

- ☐ Provisional Application
- ☒ Regular Utility Application
- ☐ Continuing Application
  - ☒ The contents of the parent are incorporated by reference
- ☐ PCT National Phase Application
- ☐ Design Application
- ☐ Reissue Application
- ☐ Plant Application
- ☐ Substitute Specification
  Sub. Spec Filed ____________
  in App. No. ____/______
- ☐ Marked up Specification re
  Sub. Spec. filed ____________
  In App. No ____/______

SPECIFICATION

METHOD OF MANUFACTURING SPARK PLUG WITH NOBLE METAL CHIP FOR INTERNAL COMBUSTION ENGINE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is based upon and claims the benefit of priority of Japanese Patent Application No. H.11-307490 filed on October 28, 1999, the content of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates to a method of manufacturing a spark plug for internal combustion engine, in particular, a method of bonding a noble metal chip to a center or ground electrode by welding.

2. Description of Related Art:

It is well known to bond a noble metal chip to a center or ground electrode only by laser welding, as shown in JP-A-6-45050. However, in a case of bonding only by laser welding, the noble metal chip has to be held by a holding jig or tool when the chip is bonded by laser welding. Accordingly, a construction of a laser welding equipment becomes complicate.

Further, as disclosed in JP-No.2921525, it is known to fix provisionally at first the noble metal chip to the center or ground electrode by resistance welding and to bond finally the same by laser welding.

However, when the noble metal chips are bonded to the respective center or ground electrodes provisionally by a conventional resistance welding method that only a current amount to be supplied and a time period for current supply are controlled at preset values and finally by a conventional laser welding method, bonding strength of the noble metal chips to the respective center or ground electrodes is likely to fluctuate.

As a result of an extensive research and experimental test, it is contemplated that this bonding strength fluctuation is caused by a fact that structure of molten portions to be formed by laser welding is uneven. Further, the uneven molten portion structure is affected by fluctuation of respective lengths of the noble metal chips to be embedded into the center or ground electrodes when the provisional resistance welding is conducted.

The experimental test result further reveals that, when the resistance welding on the noble metal chips is implemented under conditions that the current amount to be supplied and the time period for current supply are constant, the embedding length of the noble metal chips into the center or ground electrodes is fluctuated because of, for example, uneven surface roughness of cutting surfaces of the noble metal chips or uneven surface roughness of surfaces of the center or ground electrodes on which the noble metal chips are placed, respectively.

When the noble metal chip, for example, including Ir

as a main composition and having a high melting point, is fixed by resistance welding, surface roughness of the surface on which the noble metal chip and the center or ground electrode are in contact with each other largely affects on heat energy to be generated on a boundary surface between the noble metal chip and the center or ground electrode. Therefore, the resistance welding at the constant current amount and the constant time period is not sufficient enough to secure a stable and accurate embedding length of the noble metal chip into the center or ground electrode.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above mentioned problem, and an object of the present invention is to provide a method of manufacturing spark plug in which a welding condition of provisional resistance welding is controlled or adjusted to secure a uniform predetermined final embedding amount of the noble metal chip before the final laser welding is implemented. As a result, stable and accurate bonding strength of the noble metal chip to a center or ground electrode can be assured, since the construction of molten portion formed by laser welding is uniform and stable.

To achieve the above object, the steps are comprised of, at first, putting a noble metal chip on a leading end of one of the center and ground electrodes so that a surface of the noble metal chip may come in contact with a surface of the leading end of the one of the center and ground electrodes,

next, executing resistance welding provisionally in such a manner that current is passed through the noble metal chip and the leading end of the one of the center and ground electrodes, while the noble metal chip is pressed toward the leading end of the one of the center and ground electrodes, so as to fix the noble metal chip to the one of the center and ground electrodes in a state that a part of the noble metal chip is embedded into the one of the center and ground electrodes, and, then, executing laser welding finally so as to melt a circumference of a portion where the noble metal chip is embedded into the one of the center and ground electrodes.

When the provisional welding is executed, at least one of a current supply amount and a current supply time period is controlled according to at least one of a transit embedding length and a transit embedding speed of the noble metal chip to the one of the center and ground electrodes to establish a predetermined final embedding amount of the noble metal chip to the one of the center and ground electrodes.

It is preferable that first and second electrodes (upper and lower electrodes) of a resistance welding equipment are set to be electrically conductive with the noble metal chip and the one of the center and ground electrodes, while the first electrode presses the noble metal chip toward the one of the center and ground electrodes. The current supplied between the first and second electrodes by a power source of the resistance welding is controlled by a transit moving length or a transit moving speed of at one of the first and second

electrodes, which corresponds to the transit embedding length or the transit embedding speed of the noble metal chip to the one of the center and ground electrodes.

Furthermore, the predetermined final embedding amount of the noble metal chip is, preferably, not larger than 0.1 mm to obtain an adequate alloy ratio of the noble metal chip to the one of the center and ground electrodes.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the present invention will be appreciated, as well as methods of operation and the function of the related parts, from a study of the following detailed description, the appended claims, and the drawings, all of which form a part of this application. In the drawings:

Fig. 1 is a semi cross sectional view of a spark plug according to an embodiment of the present invention;

Fig. 2 is a schematic view showing a resistance welding method for manufacturing the spark plug according to the embodiment; and

Fig. 3 is a chart showing fluctuation of embedding lengths of noble metal chips into center or ground electrodes.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 shows a semi-cross sectional view of a spark plug for an internal combustion engine according to a preferred embodiment of the present invention.

The spark plug 1 has a tubular housing 1 having a thread

1a for mounting to an engine cylinder block (not shown). An insulator 2 made of alumina ceramics (Al_2O_3) is fitted into the housing 1 and an end portion 2b of the insulator 2 is exposed out of the housing 1.

A center electrode 3 is inserted into and fixed to a through hole 2a of the insulator 2. The center electrode 3 is composed of a column shaped main body whose inner member is made of metal material having good thermal conductivity such as copper and whose outer member is made of metal material having good heat resistance and corrosion endurance such as Ni base alloy. The insulator 2 surrounds a circumference of the center electrode 3 so as to expose a leading end portion 3a of the center electrode 3 out of the end portion 2b of the insulator 2, as shown in Fig. 1.

A ground electrode 4 is composed of a pillar shaped body whose one end 4a is fixed to the end of the housing 1 by welding and which is formed in a letter L shape as a whole. An end portion 4b opposite to the end 4a of the ground electrode 4 faces the leading end portion 3a of the center electrode 3 to constitute a spark discharge gap 6 therebetween. The ground electrode 4 is made of metal material having good heat resistance and corrosion endurance such as Ni base alloy.

In view of reducing spark consumption of spark discharge portions of the electrodes 3 and 4, noble metal chips 51 and 52 are bonded and fixed to the leading end portion 3a of the center electrode 3 and the leading end portion 4b of the ground electrode 4, respectively, finally by laser welding. Each

of the noble metal chips 51 and 52 is, for example, a pillar shaped element made of pure Ir or Ir alloy containing at least one of material selected from Rh, Ru, Pt and Y_2O_3. The spark discharge gap 6, for example, 1 mm, is constituted by a distance between the noble metal chips 51 and 52.

Next, a manufacturing process of the spark plug according to the present embodiment mainly with respect to a method of bonding the noble metal chip to the center or ground electrode 3 or 4 is described hereinafter and the explanation with respect to methods of manufacturing the other parts is omitted as they are well known. The method according to the embodiment of the present invention is a method of provisionally fixing at first the noble metal chip 51 or 52 to the center or ground electrode 3 or 4 by resistance welding and, then, finally bonding the same by laser welding. A resistance welding equipment and a laser welding equipment, which are widely prevailing, may be used.

Fig.2 shows schematically a method of fixing provisionally the chip 51 to the center electrode 3 by resistance welding. A method of fixing provisionally the chip 52 to the ground electrode 4, the explanation of which is omitted, is similar to the method shown in Fig. 2. A view on a left side of a dot-dash line of Fig. 2 shows a state before current is supplied for resistance welding and a view on a right side thereof shows a state after current has been supplied.

As shown in Fig. 2, the resistance welding equipment is provided with an upper electrode 7 (first electrode), a

lower electrode 8 (second electrode) and a power source 9 for generating resistance heat between the upper and lower electrodes 7 and 8. The upper and lower electrodes 7 and 8 may press the work intervening between both the electrodes 7 and 8 (the noble metal chip 51 and the center electrode 3) in a facing direction of the electrodes 7 and 8 (up and down direction in Fig. 2).

A first step for provisionally fixing the noble metal chip 51 to the center electrode 3, the noble metal chip 51 is put on the center electrode 3 so as to come in contact with a welding surface of the leading end portion 3a of the center electrode 3, while making the center electrode 3 electrically conductive with the lower electrode 8 and making the noble metal chip 51 electrically conductive with the upper electrode 7. Then, the power source 9 supplies current between the upper and lower electrodes 7 and 8, while the chip 51 is pressed toward the leading end portion 3a of the center electrode 3 with a pressing force (for example, 250 N). An amount of current is controlled (for example, within several hundreds A) or a current supply time period is controlled (for example, within several hundreds m sec). As a result, the noble metal chip 51 is provisionally fixed to the leading end portion 3a of the center electrode 3.

As the chip 51 is pressed toward the leading end portion 3a of the center electrode 3, a part of the chip 51 is embedded into the leading end portion 3a. According to the embodiment of the present invention, a transit moving amount or moving

speed of the upper electrode 7 (or a moving amount or moving speed of the lower electrode 8), which corresponds to a transit embedding length or embedding speed of the chip 51 to the center electrode 3, is measured, for example, by a displacement meter provided in the upper electrode 7 before the upper electrode 7 establishes a final moving amount X shown in Fig. 2 and, according to the measurement result, the time period or the amount of current to be supplied between the electrodes 7 and 8 by the power source is adjusted in order for the upper electrode 7 to accurately establish the moving amount X so that the embedding length of the chip 51 to the center electrode 3 may be stably controlled.

The adjustment of the time period of a predetermined current to be supplied may be also conducted in such a manner that the predetermined current supply continues until the fact that the upper electrode 7 has established the moving amount X is noticed visually or in use of a television camera.

Fig. 3 shows a result of experimental test, which shows fluctuation of the embedding length of the noble metal chip to the center or ground electrode. The test was conducted on a pillar shaped noble metal chip 51 whose length is 0.85 mm and whose diameter is 0.7 mm by supplying different current amount, 500A (□ plot), 300A (● plot) or 100A (○ plot) with 250 N constant pressing force. With respect to each of the current amount to be supplied, a relationship between the moving amount X (mm) of the upper electrode 7, which corresponds to the embedding length of the noble metal chip, and the current

time period (m second) is illustrated in Fig. 3. A sample number n of each plot is 20 and a fluctuation amount of each plot (a range shown by opposite arrows in Fig.3) is 4σ.

As shown in Fig. 3, when the welding condition is always constant, that is, when the current supply amount and the current supply time period are not controlled according to the transit embedding amount or speed, the fluctuation of the final embedding amount of the noble metal chip to the center or ground electrode is very large in each plot as shown in the apposite arrows in Fig.3. This large fluctuation of the embedding amount causes a structure fluctuation of molten portions formed finally by laser welding.

However, when the current supply amount or the current supply time period of the power source 9 is feedback controlled by watching the embedding amount of the noble metal chip to the center or ground electrode, moving amount of the upper or lower electrode 7 or 8 in an acting direction of pressing force, during a course of resistance welding operation, as mentioned above, the final embedding amount becomes constant and the fluctuation thereof is limited.

After the provisional resistance welding as mentioned above, the laser welding (for example, 8 points welding) is conducted around a circumference of the embedded portion of the noble metal chip 51 to the center electrode 3 to melt respective parts of the noble metal chip 51 and the center electrode 3.

This welding method is also applicable to the noble metal

chip 52 and the ground electrode 4. As a first step of conducting provisional resistance welding, the noble metal chip 52 is put on the ground electrode 4 so as to come in contact with a welding surface of the leading end portion 4b of the ground electrode 4, while making the center electrode 3 electrically conductive with the lower electrode 8 and making the noble metal chip 52 electrically conductive with the upper electrode 7. Then, the feedback control of current from the power source 9 is executed similarly as the case of welding the chip 51 to the center electrode 3 to complete the resistance welding. Finally, the laser welding is conducted to bond the chip 52 to the ground electrode 4.

In summary, in the manufacturing method according to the embodiment of the present invention, the current supply amount or the current supply time period of the provisional resistance welding is controlled by the transit moving amount or moving speed of the upper or lower electrode 7 or 8 in a pressing force direction thereof, which corresponds to the transit embedding length or embedding speed of the noble metal chip 51 or 52 to the center or ground electrode 3 or 4. Accordingly, an accurate and stable embedding length of the noble metal chip 51 or 52 to the center or ground electrode 51 or 52 may be secured So that the structure of the molten portion formed by the final laser welding may become uniform and stable.

Further, as a result of investigation, it is concluded that the embedding length of the noble metal chip 51 or 52

to the center or ground electrode 51 or 52 is preferably not larger than 0.1 mm to secure a sufficient bonding strength of the molten portion composed of alloy formed by the laser welding.

Though the center and ground electrodes 3 and 4 are provided with the noble metal chips 51 and 52, respectively, according to the embodiment mentioned above, at least one of the electrodes 3 and 4 may be provided with one of the noble metal chips 51 and 52. Further, the bonding method according to the present invention may be applied to at least one of the center and ground electrodes 3 and 4 that are provided with the noble metal chips 51 and 52, respectively.

WHAT IS CLAIMED IS:

1. A method of manufacturing a spark plug for internal combustion engine having a center electrode, a housing surrounding and holding the center electrode so as to expose a leading end of the center electrode out of an end of the housing and a ground electrode whose one leading end is fixed to the end of the housing and whose another leading end faces the leading end of the center electrode to constitute a spark discharge gap therebetween, and a noble metal chip bonded to the leading end of at least one of the center and ground electrodes, comprising steps of:

putting the noble metal chip on the leading end of the one of the center and ground electrodes so that a surface of the noble metal chip may come in contact with a surface of the leading end of the one of the center and ground electrodes;

executing resistance welding provisionally in such a manner that current is passed through the noble metal chip and the leading end of the one of the center and ground electrodes, while the noble metal chip is pressed toward the leading end of the one of the center and ground electrodes, so as to fix the noble metal chip to the one of the center and ground electrodes in a state that a part of the noble metal chip is embedded into the one of the center and ground electrodes; and

executing laser welding finally so as to melt a circumference of a portion where the noble metal chip is

embedded into the one of the center and ground electrodes,

wherein at least one of a current supply amount and a current supply time period by the provisional resistance welding is controlled according to at least one of a transit embedding length and a transit embedding speed of the noble metal chip to the one of the center and ground electrodes to establish a predetermined final embedding amount of the noble metal chip to the one of the center and ground electrodes.

2. A method of manufacturing a spark plug according to claim 1, wherein a resistance welding equipment to be used in resistance welding has a first electrode electrically conductive to the noble metal chip and a second electrode electrically conductive to the one of the center and ground electrodes and, while the first electrode presses the noble metal chip toward the one of the center and the ground electrodes, the current supplied between the first and second electrodes passes through the noble metal chip and the leading end of the one of the center and ground electrodes and, further, wherein the one of the transit embedding length and the transit embedding speed of the noble metal chip to the one of the center and ground electrodes is measured by at least one of a transit moving length and a transit moving speed of at least one of the first and second electrodes.

3. A method of manufacturing a spark plug according to claim 1, wherein the predetermined final embedding amount

of the noble metal chip to the one of the center and ground electrodes is not larger than 0.1 mm.

4. a method of manufacturing a spark plug according to claim 1, wherein the noble metal chip is made of one of pure Ir and Ir alloy including at least one of Rh, Ru, Pt and Y_2O_3.

ABSTRACT OF THE DISCLOSURE

In a method of manufacturing a spark plug in which a noble metal chip provisionally fixed to a center or ground electrode by resistance welding and finally bonded to the center or ground electrode by laser welding, a current supply time period of the resistance welding is controlled according to a transit moving amount of an upper or lower electrode of a resistance welding equipment, which corresponds to a transit embedding length of the noble metal chip to the center or ground electrode, to establish a predetermined final embedding amount of the noble metal chip to the center or ground electrode.

FIG. 1

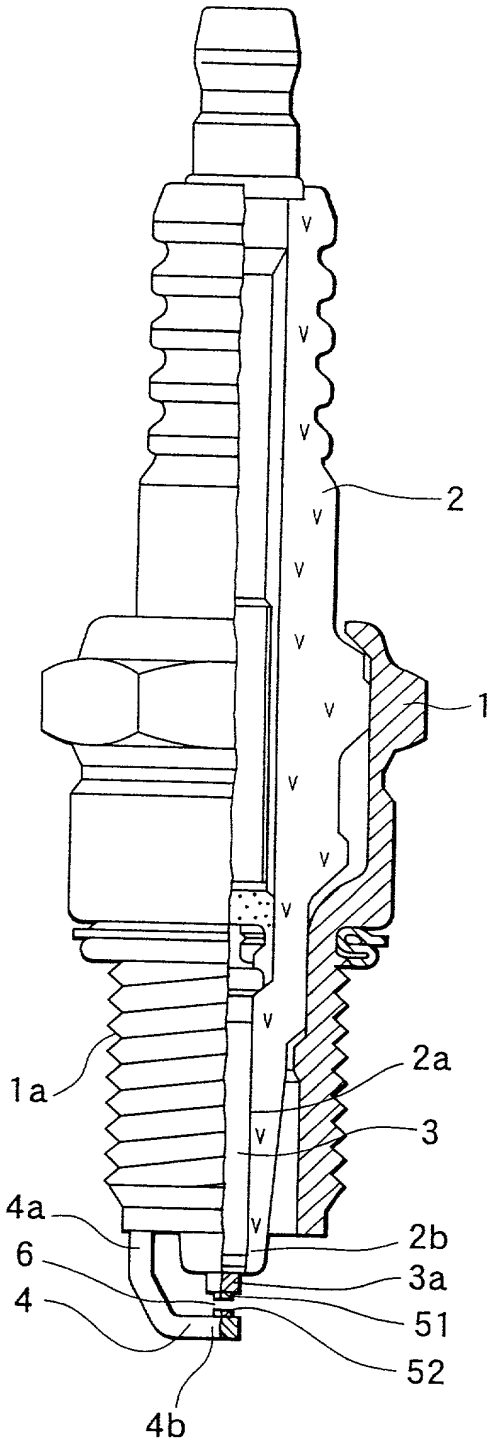


FIG. 2

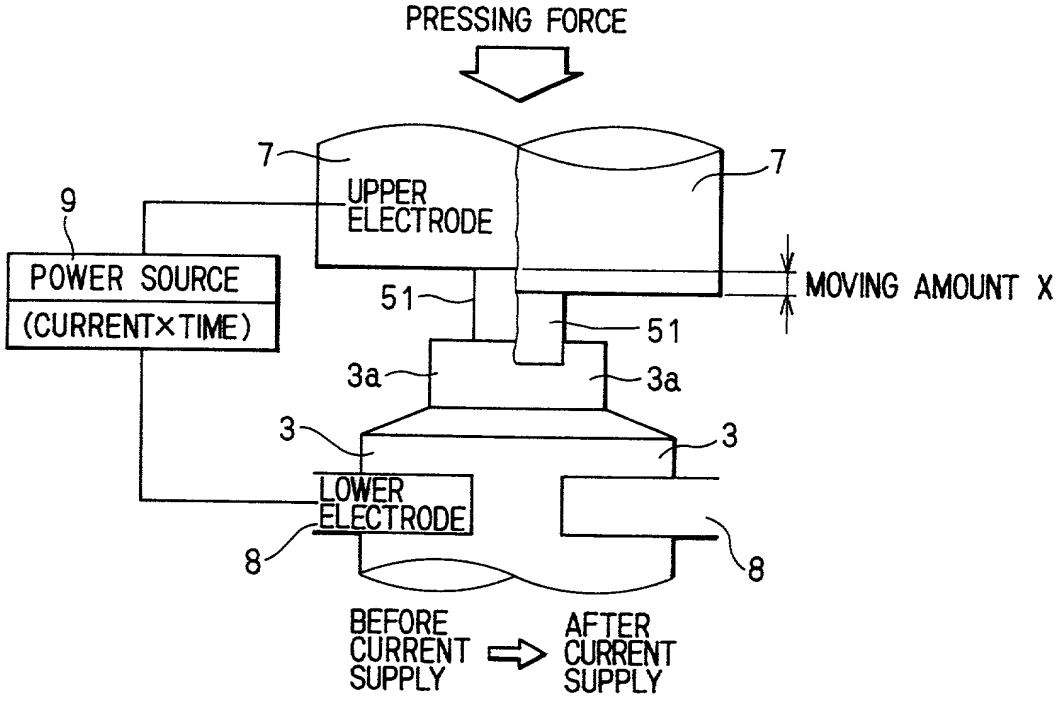
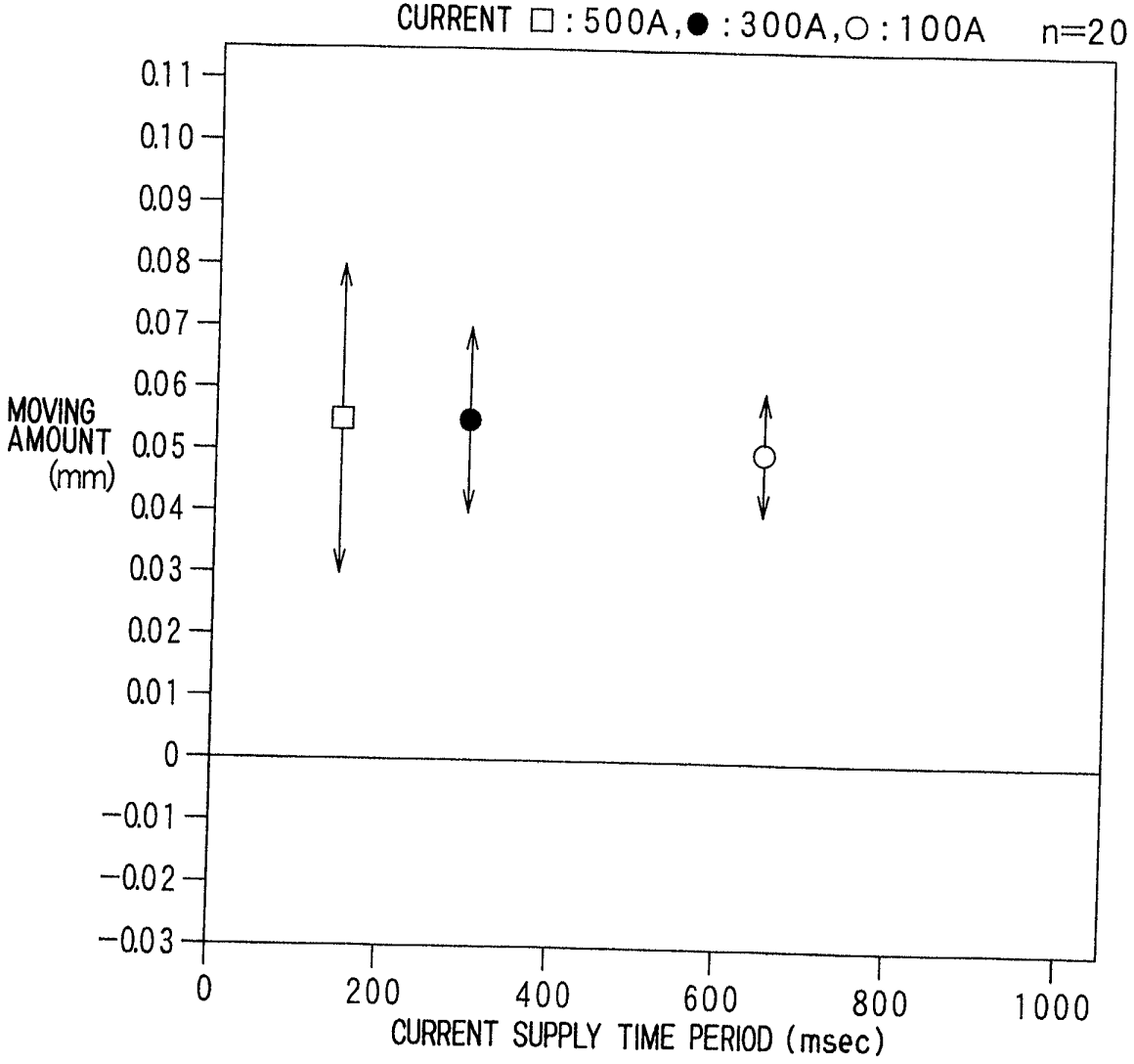

PRESSING FORCE
7
7
9
UPPER ELECTRODE
POWER SOURCE
(CURRENT×TIME)
51
51
MOVING AMOUNT X
3a
3a
3
3
LOWER ELECTRODE
8
8
BEFORE CURRENT SUPPLY
AFTER CURRENT SUPPLY

FIG. 3



54586-US
1/3.

Pillsbury Madison & Sutro LLP
Intellectual Property Group
Attorney Docket No.

Declaration and Power of Attorney for Patent Application
特許出願宣誓書及び委任状
Japanese Language Declaration
日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者(下記の氏名が一つの場合)もしくは最初かつ共同発明者であると(下記の名称が複数の場合)信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD OF MANUFACTURING SPARK PLUG WITH NOBLE METAL CHIP FOR INTERNAL COMBUSTION ENGINE

上記発明の明細書(下記の欄で×印がついていない場合は、本書に添付)は、

the specification of which is attached hereto unless the following box is checked:

☐ _____に提出され、
米国出願番号または特許協力条約国際出願番号を
_____とし、
(該当する場合)_____に訂正されました。

☐ was filed on_____
as United States Application Number or PCT International Application Number_____
and was amended on _____
(if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37編第1条56項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

私は、米国法典第35編119条(a)-(d)項又は365条(b)項に基き下記の、米国以外の国の少なくとも一ヵ国を指定している特許協力条約365(a)項に基く国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

I hereby claim foreign priority under Title 35, United States Code, Section 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

PM&S

Japanese Language Declaration
(日本語宣言書)

Prior Foreign Application(s)
外国での先行出願

	(Number) (番号)	(Country) (国名)	(Day/Month/Year Filed) (出願年月日)	Priority Not Claimed (優先権主張なし)
1.	11-307490	JAPAN	28/OCTOBER/1999	☐
2.				☐
3.				☐
4.				☐
5.				☐
6.				☐
7.				☐

☐ Additional Foreign Application(s) is(are) listed on the attached sheet which is incorporated herein by reference.

私は、第３５編米国法典１１９条(e)項に基いて下記の米国特許出願規定に記載された権利をここに主張いたします。

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.) (出願番号)	(Filing Date) (出願日)

(Application No.) (出願番号)	(Filing Date) (出願日)

私は、下記の米国法典第３５編１２０条に基いて下記の米国特許出願に記載された権利、又は米国を指定している特許協力条約３６５条(c)に基く権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第３５編１１２条第１項又は特許協力条約で規定された方法で先行する米国特許出願に開示されていない限り、その先行米国出願書提出日以降で本出願書の日本国内または特許協力条約国際提出日までの期間中に入手された、連邦規則法典第３７編１条５６項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

Application No. (出願番号)	Filing Date (出願日)	Status : Patented, Pending, Abandoned (現況) (特許許可済)、(係属中)、(放棄済)

54586-US
3/6

PM&S

Japanese Language Declaration
(日本語宣言書)

私は、私自身の知識に基いて本宣言書中で私が行う表明が真実であり、かつ私の入手した情報と私の信じるところに基く表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第１８編第１００１条に基き、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行えば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

委任状： 私は下記の発明者として、本出願に関する一切の手続を米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。(弁護士、または代理人の氏名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number).

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☐ Additional inventor(s) is(are) listed on the attached sheet which is incorporated herein by reference.